

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listings of claims in the application.

1. (Currently amended) An isolated nucleic acid comprising a transcriptional unit encoding a signal sequence of a structural protein of a first flavivirus and an immunogenic flavivirus antigen, wherein the antigen is of a second flavivirus or the antigen is a chimeric antigen comprising amino acid sequence from more than one flavivirus, wherein the signal sequence is a Japanese encephalitis virus sequence, and wherein the transcriptional unit directs the synthesis of the antigen.

2. (Canceled)

3. (Currently amended) The nucleic acid of claim 1, wherein the immunogenic flavivirus antigen is of a flavivirus selected from the group consisting of yellow fever virus, dengue serotype 1 virus, dengue serotype 2 virus, dengue serotype 3 virus, dengue serotype 4 virus, ~~Japanese encephalitis virus~~, St. Louis encephalitis virus, Powassan virus and West Nile virus.

4. (Original) The nucleic acid of claim 1, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus and an M protein and an E protein of West Nile virus.

5. (Original) The nucleic acid of claim 1, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus and an M protein and an E protein of yellow fever virus.

6. (Original) The nucleic acid of claim 1, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus and an M protein and an E protein of St. Louis encephalitis virus.

7. (Original) The nucleic acid of claim 1, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus and an M protein and an E protein of Powassan virus.

8. (Previously presented) The nucleic acid of claim 1, wherein the flavivirus antigen is selected from the group consisting of an M protein, an E protein, both an M protein and an E protein, a portion of an M protein, a portion of an E protein, and both a portion of an M protein and a portion of an E protein, or any combination thereof.

9. (Previously presented) The nucleic acid of claim 8, wherein the antigen is both the M protein and the E protein.

10. (Original) The nucleic acid of claim 1, wherein the nucleic acid is DNA.

11. (Original) The nucleic acid of claim 10, comprising a nucleotide sequence selected from the group consisting of SEQ ID NO:15, SEQ ID NO:19, SEQ ID NO:21 and SEQ ID NO:23.

12. (Original) The nucleic acid of claim 1, wherein the transcriptional unit comprises a control sequence disposed appropriately such that it operably controls the synthesis of the antigen.

13. (Original) The nucleic acid of claim 12, wherein the control sequence is the cytomegalovirus immediate early promoter.

14. (Previously presented) The nucleic acid of claim 1, comprising a Kozak consensus sequence located at a translational start site for a polypeptide comprising the antigen encoded by the transcriptional unit.

15. (Original) The nucleic acid of claim 1 wherein the transcriptional unit comprises a poly-A terminator.

16. (Currently amended) ~~A cell~~ An isolated cell comprising the nucleic acid of claim 1.

17. (Original) A composition comprising the nucleic acid of claim 1 and a pharmaceutically acceptable carrier.

18. (Withdrawn) A method of immunizing a subject against infection by a flavivirus, comprising administering to the subject an effective amount of the composition of claim 17.

19. (Withdrawn) The method of claim 18, wherein the flavivirus antigen is of a flavivirus or flaviviruses selected from the group consisting of yellow fever virus, dengue serotype 1 virus, dengue serotype 2 virus, dengue serotype 3 virus, dengue serotype 4 virus, Japanese encephalitis virus, St. Louis encephalitis virus, Powassan virus and West Nile virus, or any combination thereof.

20. (Withdrawn) The method of claim 18, wherein the flavivirus antigen is selected from the group consisting of an M protein, an E protein, both an M protein and an E protein, a portion of an M protein, a portion of an E protein, and both a portion of an M protein and a portion of an E protein, or any combination thereof.

21. (Withdrawn) The method of claim 20, wherein the flavivirus antigen is both the M protein and the E protein, and wherein a cell within the body of the subject, after incorporating the nucleic acid within it, secretes subviral particles comprising the M protein and the E protein.

22. (Withdrawn) The method of claim 18, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus, and an M protein and an E protein of West Nile virus.

23. (Withdrawn) The method of claim 18, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus, and an M protein and an E protein of yellow fever virus.

24. (Withdrawn) The method of claim 18, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus, and an M protein and an E protein of St. Louis encephalitis virus.

25. (Withdrawn) The method of claim 18, wherein the transcriptional unit encodes a signal sequence of Japanese encephalitis virus, and an M protein and an E protein of Powassan virus.

26. (Withdrawn) The method of claim 18, comprising administering the composition to the subject in a single dose.

27. (Withdrawn) The method of claim 18, wherein the composition is administered via a parenteral route.

28. (Previously presented) The nucleic acid of claim 1, wherein the antigen comprises a St. Louis encephalitis virus antigen.

29. (Withdrawn) The method of claim 18, wherein the antigen comprises a St. Louis encephalitis virus antigen.

30. (Previously presented) The nucleic acid of claim 1, wherein the antigen comprises a Japanese encephalitis virus antigen.

31. (Withdrawn) The method of claim 18, wherein the antigen comprises a Japanese encephalitis virus antigen.

32. (Previously presented) The nucleic acid of claim 1, wherein the antigen comprises a yellow fever virus antigen.

33. (Withdrawn) The method of claim 18, wherein the antigen comprises a yellow fever virus antigen.

34. (Previously presented) The nucleic acid of claim 1, wherein the antigen comprises a dengue virus antigen.

35. (Withdrawn) The method of claim 18, wherein the antigen comprises a dengue virus antigen.

36. (Previously presented) The nucleic acid of claim 1, wherein the antigen comprises a West Nile virus antigen.

37. (Withdrawn) The method of claim 18, wherein the antigen comprises a West Nile virus antigen.

38. (Withdrawn) An antigen produced from the nucleic acid of claim 1.

39. (Withdrawn) A method of detecting a flavivirus antibody in a sample, comprising:
(a) contacting the sample with the antigen of claim 38 under conditions whereby an antigen/antibody complex can form; and
(b) detecting antigen/antibody complex formation, thereby detecting a flavivirus antibody in the sample.

40. (Withdrawn) An antibody produced in response to immunization the antigen of claim 38.

41. (Withdrawn) A method of detecting a flavivirus antigen in a sample, comprising:

(a) contacting the sample with the antibody of claim 40 under conditions whereby an antigen/antibody complex can form; and

(b) detecting antigen/antibody complex formation, thereby detecting a flavivirus antigen in a sample.

42. (Withdrawn) A method of diagnosing a flavivirus infection in a subject, comprising:

(a) contacting a sample from the subject with the antigen of claim 38 under conditions whereby an antigen/antibody complex can form; and

(b) detecting antigen/antibody complex formation, thereby diagnosing a flavivirus infection in a subject.

43. (Withdrawn) A method of diagnosing a flavivirus infection in a subject, comprising:

(a) contacting a sample from the subject with the antibody of claim 40 under conditions whereby an antigen/antibody complex can form; and

(b) detecting antigen/antibody complex formation, thereby diagnosing a flavivirus infection in a subject.

44. (Currently amended) The nucleic acid of claim 1 ~~claim 2~~, wherein the signal sequence is a modified Japanese encephalitis virus signal sequence.

45. (Previously presented) The nucleic acid of claim 1, wherein the immunogenic flavivirus antigen is a chimeric antigen comprising amino acid sequence from more than one flavivirus, wherein the flaviviruses are selected from yellow fever virus, dengue serotype 1 virus, dengue serotype 2 virus, dengue serotype 3 virus, dengue serotype 4 virus, Japanese encephalitis virus, St. Louis encephalitis virus, Powassan virus and West Nile virus.

46. (Previously presented) The nucleic acid of claim 1, wherein the immunogenic flavivirus antigen is a chimeric antigen comprising amino acid sequence from the first flavivirus and a second flavivirus, wherein the flaviviruses are selected from yellow fever virus, dengue

serotype 1 virus, dengue serotype 2 virus, dengue serotype 3 virus, dengue serotype 4 virus, Japanese encephalitis virus, St. Louis encephalitis virus, Powassan virus and West Nile virus.

47. (Previously presented) The nucleic acid of claim 46, wherein the first flavivirus is Japanese encephalitis virus.

48. (Previously presented) The nucleic acid of claim 46, wherein the immunogenic flavivirus antigen comprises a chimeric E protein.

49. (Previously presented) The nucleic acid of claim 46, wherein the immunogenic flavivirus antigen comprises an M protein from the second flavivirus and a chimeric E protein comprising amino acid sequence from Japanese encephalitis virus and the second flavivirus.

50. (Currently amended) The nucleic acid of claim 49, wherein the chimeric E protein comprises a carboxy terminal portion from Japanese encephalitis virus, wherein the carboxy terminal portion is ~~about~~ 5%, 10%, 15%, 20%, 25%, 30%, 40%, 50% or 75% of the chimeric E protein.

51. (Currently amended) The nucleic acid of claim 50, wherein the carboxy terminal portion is at least ~~about~~ 10% of the chimeric E protein.

52. (Currently amended) The nucleic acid of claim 51, wherein the carboxy terminal portion is at least ~~about~~ 20% of the chimeric E protein.

53. (Previously presented) The nucleic acid of claim 49, wherein the second flavivirus is a dengue virus.

54. (Previously presented) The nucleic acid of claim 49, wherein the second flavivirus is a St. Louis encephalitis virus.